

**THE BLACK MUSTACHE URANIUM –  
VANADIUM MINE APACHE COUNTY,  
ARIZONA AND THE PROBABLE  
SOURCE OF THE ORE SIPMENTS**

by

William L. Chenoweth  
Consulting Geologist, Grand Junction, Colorado

Arizona Geological Survey  
**Contributed Report 94-A**  
February 1994

**Arizona Geological Survey**  
416 W. Congress, Suite #100, Tucson, Arizona 85701

*Interpretations and conclusions in this report are those of the consultant  
and do not necessarily coincide with those of the staff of the Arizona  
Geological Survey*

This report is preliminary and has not been edited  
or reviewed for conformity with Arizona Geological Survey standards

# **The Black Mustache Uranium - Vanadium Mine, Apache County, Arizona and the Probable Source of the Ore Shipments.**

## **INTRODUCTION**

Robert Scarborough (1981, p. 107 in his compilation of uranium in Arizona was unable to find much information on the Black Mustache mine. Records of the U.S. Atomic Energy Commission (AEC) noted that the mine was located in the Monument Valley area of Apache County, Arizona

The legal location of the mine was recently obtained by the author in the old Bureau of Indian Affairs (BIA) records, stored in the Bureau of Land Management (BLM) archives in Phoenix, Arizona. Recollections by a former AEC geologist, who worked in Monument Valley, shed some light on the probable source of the ore shipments. Additional information is from AEC documents. The author was employed by the AEC on the Navajo Indian Reservation during the years 1953-1963.

## **LAND STATUS AND PERMITTING**

The mine was within the Navajo Indian Reservation. Mining permits and leases were issued by the Navajo Tribal Council and approved by the Bureau of Indian Affairs (BIA), U.S. Department of the Interior. Mining permits could be obtained by individual Navajos only. Permit holders could assign the mining rights to another individual or a company; like the permits, these assignments had to be approved by the Tribal Council and the BIA. Leases could be

issued directly by the BIA. Permits were issued for a 2-year period and could be renewed for an additional 2 years. Leases were issued for period up to 10 years. No more then 960 acres of tribal land could be held by any one company or individual

On September 29, 1950 the Navajo Tribal Council and the BIA approved an unnumbered mining permit (MP) to Capitan Benally of Shiprock, New Mexico. The permit was for 940 acres on Mexican Cry Mesa in the Lukachukai Mountains (Figure 1). The permit was in an area where Coleman 1943) had described a small exposure of vanadium minerals. See the appendix for the legal description of the Mexican Cry No. 1 Claim

This mining permit was one of the last of the unnumbered permits issued. Due to the increased interest in uranium, the Tribal Council and the BIA began numbering mining permits in 1952. According to BIA records, in the AEC files, this was the only mining permit issued to Capitan Benally in the 1950-1954 period

#### **PRODUCTION**

The U.S. Geological Survey (USGS), Conservation Division, at the request of the BIA, checked ore receipts at the uranium mills to make sure the Tribe and the permittee would receive their royalty payments. Unpublished USGS royalty calculation sheets, in the AEC files, show that in November and December, 1950, Capitan Benally shipped a total of 20.09 tons of ore to the Vanadium Corporation of

America mill at Durango, Colorado (Table 1). These shipments were labeled the Black Mustache mine, located in Monument Valley, Apache County, Arizona.

In January, February, March and in August September and October, 1951, Thomas Benally shipped an additional 74.70 tons to Durango (Table 1). These shipments also were labeled the Black Mustache mine. The USGS credited these shipments to Capitan Benally's unnumbered mining permit. A total of 94.79 tons averaging 0.23 percent  $U_3O_8$  and 1.99 percent  $V_2O_5$ , were shipped from the Black Mustache mine over a 12 month period. Capitan and Thomas Benally received a total of \$1,976.82 for the shipments from VCA from which the Tribe was due \$197.69 in royalties, according to the USGS.

#### PROBABLE SOURCE OF ORE

It is highly unlikely that the ore shipments labeled the Black Mustache mine came from the Salt Wash Member of the Jurassic Morrison Formation on Mexican Cry Mesa. In the summer of 1951, three AEC geologists made a survey of the Salt Wash sandstone capping Mexican Cry Mesa. At that time there were no roads on to the mesa, and they found no evidence of any surface disturbance in the area of Capitan Benally's mining permit (Ellsworth, 1951). Nestler and Chenoweth (1958) in their summary of the uranium geology of the Lukachukai Mountains, also found no evidence of mining on the northern part of Mexican Cry Mesa.

During the late 1940's and early 1950's, Vanadium Corporation of America (VCA), and individual Navajo's mining in the vicinity of VCA's Monument No. 2 mine (Figure 2 stockpiled their ore north of Mexican Hat, Utah along State Highway 47 (Now U.S. 163). Companies mining on Oljeto Mesa and on Monitor Butte in San Juan County, Utah (Figure 2 also stockpiled their ores here. This was done since

small, narrow, suspension bridge across the San Juan River at Mexican Hat could not support large trucks. Ores were hauled from the mines in the Cane Valley of Apache County in five-ton trucks to the stockpile area. See Gregg and Evensen 1989 for details of this early mining. When the individual mine piles reached a few dozen tons, 21-ton semitrailer trucks were used to haul the ore to the AEC ore-buying station at Monticello, Utah or the VCA mill at Durango, Colorado. The wagon road from Cane Valley over Comb Ridge (Figure 2), connecting to the Kayenta - Shiprock road (now U.S

was not improved by the AEC until 1952 (Chenoweth, 1989 When completed, this route greatly reduced the mileage to Durango Colorado, and eliminated the Mexican Hat stockpiling. The uranium vanadium ore in Monument Valley occurred in the Shinarump Member of the Triassic Chinle Formation.

According to Russell C. Cutter (personal communication, November 1993), a former AEC geologist who studied the uranium deposits in Monument Valley in the early 1950's, it was common knowledge around Mexican Hat that some Navajo's moved ore from the large VCA stockpile into their own piles. During 1950 and 1951, VCA was

shipping an average of 2,200 tons of ore per month to Durango (unpublished AEC production records). A few tons per week was not missed by VCA, according to Cutter.

#### SUMMARY

Uranium - vanadium ore shipped as the Black Mustache mine did not come from the area of Capitan Benally's mining permit in the Lukachukai Mountains. Although the ore was reported from coming from a mine in the Cane Valley area of Monument Valley, AEC geologists did not know of any mine in that small area operated by Capitan or Thomas Benally (Clair C. Gregg, personal communication, 1989).

The uranium ores in the Shinarump Member in the Cane Valley area of Monument Valley contained more vanadium than the ores in the Salt Wash Member in the Lukachukai Mountains. AEC production records indicate that in early shipments from the Monument No. 2 mine the uranium to vanadium ratios ranged from 1:3.5 to 1:11. The uranium to vanadium ratios in ores from the Mesa VI mines in the Lukachukai Mountains, the nearest mines to Mexican Cry Mesa, ranged from 1:3.3 to 1:5.9. The average uranium to vanadium ratio in the Black Mustache ores was 1:8.6, suggesting a Shinarump origin. It is the author's belief that the large stockpile of ore from VCA's Monument No. 2 mine at Mexican Hat, Utah was the source of the shipments called the Black Mustache mine.

## **ACKNOWLEDGEMENTS**

Paul J. Buff of the Phoenix District Office of the BLM provided access to the old BIA files now stored by the BLM in Phoenix, Arizona. \_\_\_\_\_ of the Arizona Geological Survey reviewed and improved the manuscript.

## REFERENCES

- Chenoweth, W.L., 1989, The access road program of the U.S. Atomic Energy Commission in Arizona: Arizona Geological Survey Contributed Report CR-89-A 4p.
- Coleman, A.H., 1943, Mexican Cry Mesa, in Webber B.N., Field survey of Navajo Indian Reservation, Carrizo Uplift and Chuska Mountains areas: U.S. Army, Manhattan Engineer District Raw Materials Operations Report RMO - 480, p 50.
- Ellsworth, P.C., 1951, Geological investigation of Mexican Cry Mesa, Lukachukai district, Arizona with diamond drilling recommendations; U.S. Atomic Energy Commission Raw Materials Operations Report RMO-699, 8p.
- Gregg, C.C., and Evensen, C.S., 1989, Maps of the underground workings, Monument No. 2 mine, Apache County, Arizona, with a text by W.L. Chenoweth: Arizona Geological Survey Contributed Report CR-89-D, 30p.
- Nester, R.K., and Chenoweth, W.L., 1958, Geology of the uranium deposits of the Lukachukai Mountains, Apache County, Arizona: U.S. Atomic Energy Commission Raw Materials Exploration Report RME-118, 64 p.
- Scarborough, R.B., 1981, Radioactive occurrences and uranium production in Arizona, final report: Arizona Bureau of Geology and Mineral Technology Open - File Report 81-1, 297p.



## APPENDIX

### Legal description of Capitan Benally's mining permit:

"Beginning at Corner No. 1, which bears N. 74° W., 17,635 feet from Cove Day School, thence S. 65° W., 13,860 feet to Corner No. 2, thence due South, 2,640 feet to Corner No. 3, thence N. 65° E., 6,600 feet to Corner No. 4, thence S. 86° E., 3,828 feet to Corner No. 5, thence N. 20° W., 1,320 feet to Corner No. 6, thence N. 61° E., to Corner No. 7, thence N. 25° W., 2,2640 feet to Corner No. 1 and point of beginning, containing 940 acres. Claim known as Mexican Cry No. 1."

From the files of the Bureau of Indian Affairs, Window Rock, Arizona.

Table 1. Ore Shipments, Black Mustache Mine, Apache County, Arizona

Year	Month	Tons of Ore	Pounds $U_3O_8$	% $U_3O_8$	Pounds $V_2O_5$	% $V_2O_5$	Shipper
1950	November	13.58	79.14	0.29	516.00	1.90	Capitan Benally
1950	December	6.51	54.71	0.42	313.00	2.40	Capitan Benally
1951	January	6.55	28.83	0.22	262.00	2.00	Thomas Benally
1951	February	38.15	127.72	0.17	1,339.00	1.75	Thomas Benally
1951	March	6.49	19.46	0.15	221.00	1.70	Thomas Benally
1951	August	5.78	21.32	0.18	248.00	2.14	Thomas Benally
1951	September	3.73	51.44	0.69	276.00	3.70	Thomas Benally
1951	October	<u>14.00</u>	<u>49.74</u>	<u>0.18</u>	<u>602.00</u>	<u>2.15</u>	Thomas Benally
Totals		94.79	432.36	0.23	3,777.00	1.99	

Source: U.S. Geological Survey records in AEC files, Grand Junction, Colorado

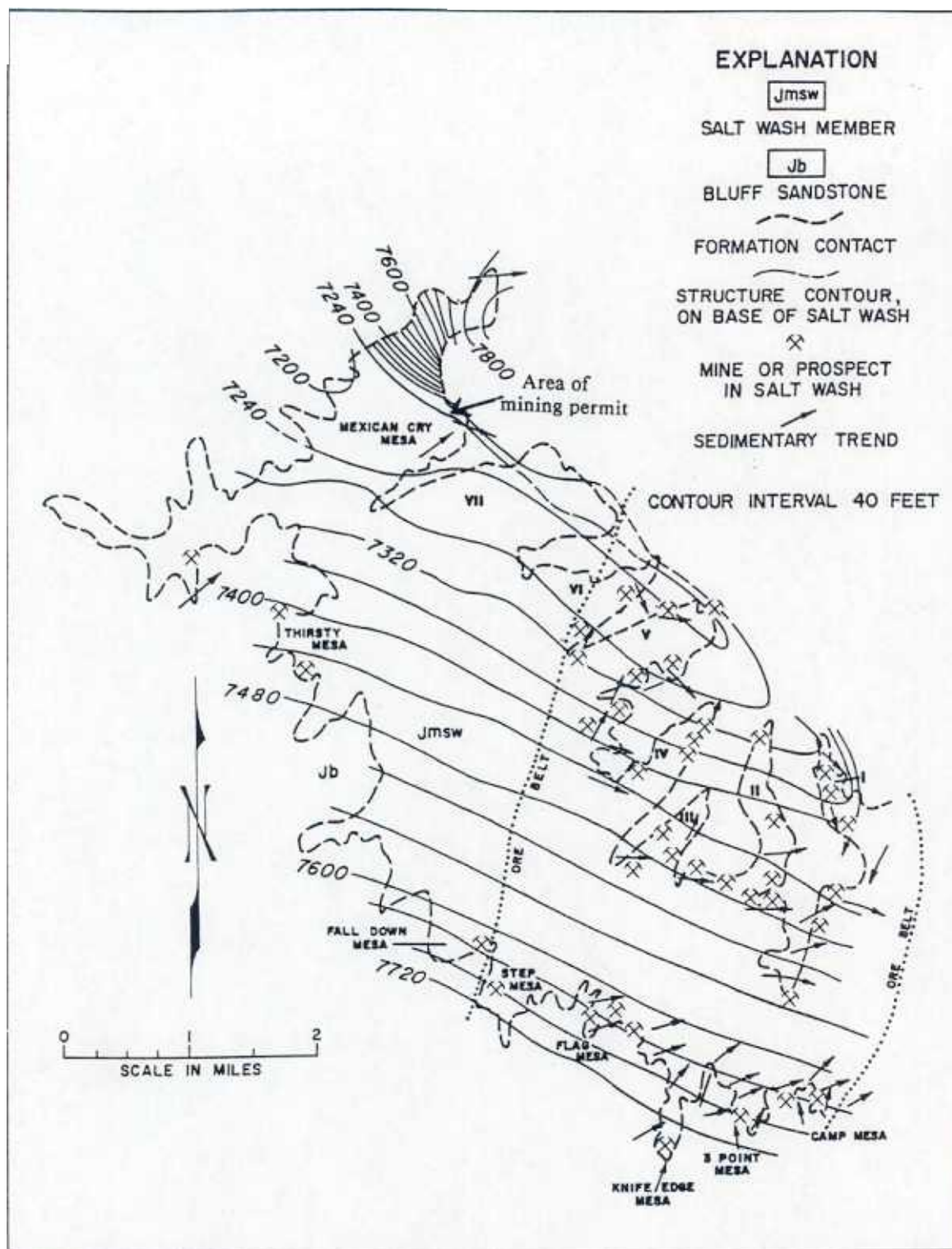


Figure 1. Index map of the Lukachukai Mountains, Apache County, Arizona, showing the location of Capitan Benally's mining permit. Modified from Nestler and Chenoweth (1958).

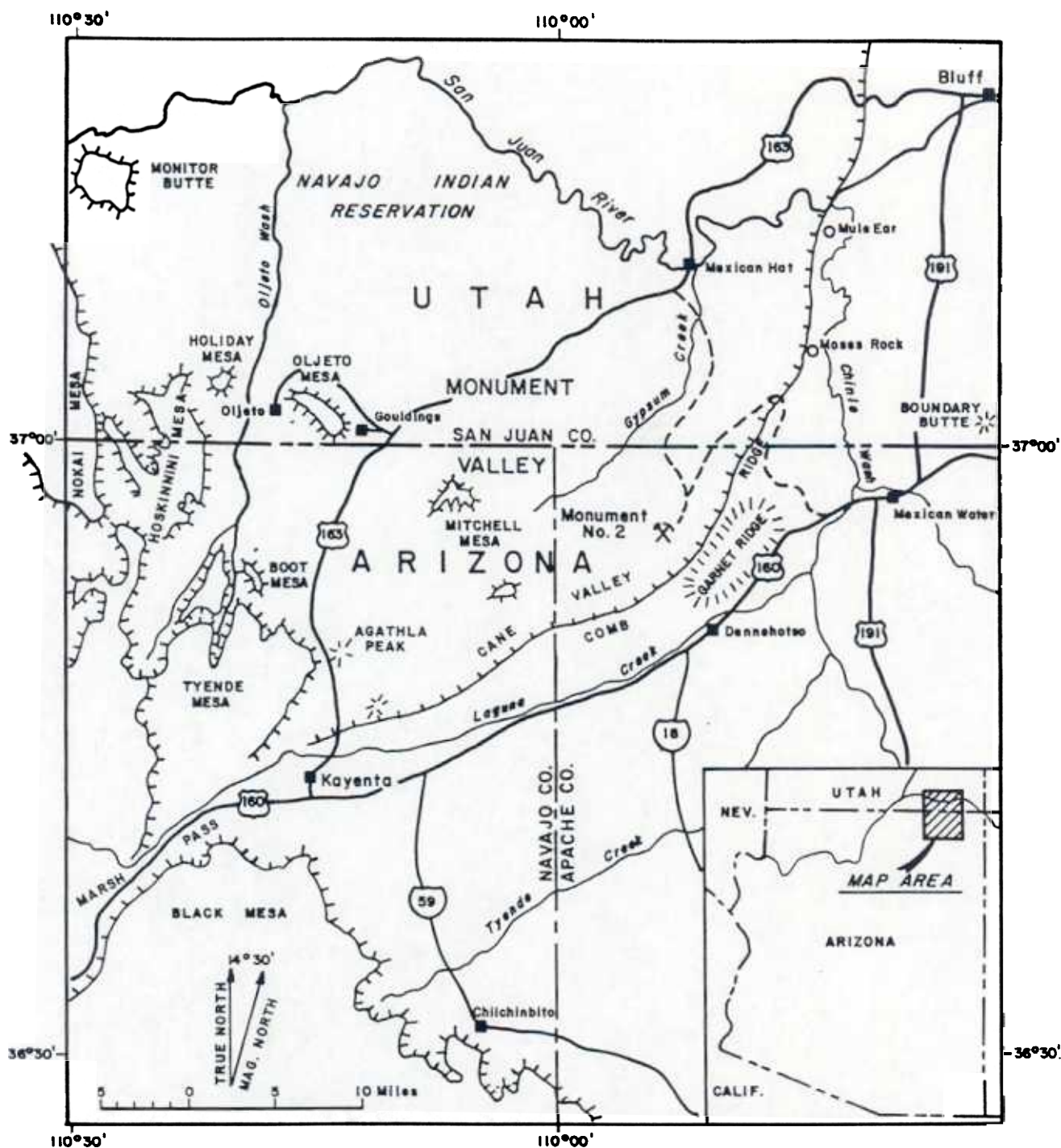


Figure 2. Index map of Monument Valley, Arizona - Utah showing the location of the Monument No. 2 mine.